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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/379,753	08/24/1999	MICHAEL N. GRIMBERGEN	3948/USA/SIL	1675

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APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 12/05/2002

21

Please find below and/or attached an Office communication concerning this application or proceeding.

9F-21

<b>Office Action Summary</b>	Application N . 09/379,753	Applicant(s) GRIMBERGEN, MICHAEL N.	
	Examiner Rudy Zervigon	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 September 2002.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6-14,23-30,33-42,44-51 and 57-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-14,23-30,33-42,44-51 and 57-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                          | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>20</u> . | 6) <input type="checkbox"/> Other:  |

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-4, 11-14, 30, 33-35, and 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giapis et al (USPat. 5,002,631) in view of Piwonka-Corle (USPat. 5,608,526). Giapis teaches a substrate etching apparatus (Figure 1; col. 3, lines 9-21) comprising a chamber (100) including:
  - i. A substrate support (110) to support a substrate (120)
  - ii. A gas distributor (102) to introduce an etchant gas into the chamber
  - iii. A gas energizer (140; column 3, lines 61-68) to energize the etchant gas
  - iv. A gas exhaust (103) to exhaust gas from the chamber

Giapis further teaches radiation sources (161, 162). Giapis further teaches one or more detectors (164, 165) to detect an intensity of a first radiation originating from the radiation source(s) and reflected from a substrate (120) or a chamber wall and generate a sample signal (column 4, lines 40-49). Giapis further teaches the detection (163) of an intensity of a second radiation (162) emitted from the radiation source and generate a reference signal (column 4, lines 40-49) at the second detector (163). Giapis further teaches the uniformity of wavelength between the first radiation reflected from the substrate and the second radiation (from the source 162) as per the

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"bifurcated fiber bundle 166" detected by one monochrometer detector 163. The depth and uniformity of Giapis' etch are monitored by laser scattered by the wafer (column 5, lines 20-23).

Giapis does not teach:

- i. a signal analyzer adapted to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal with the reference signal to generate a normalized signal, and determine a thickness of a layer being etched on the substrate or chamber wall from the normalized signal

Piwonka-Corle teaches an ellipsometry apparatus (Figure 12) for substrate analysis (column 3, lines 9-20). Specifically, Cates teaches:

- ii. a signal analyzer (100; column 15, lines 9-23) adapted to normalize the sample signal (9) relative to the reference signal ("reference beam") by mathematically operating on the sample signal with the reference signal to generate a normalized signal ("is programmed to normalize"), and determine a thickness of a layer on a substrate from the normalized signal

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Giapis to use Piwonka-Corle's signal analyzer to determine a thickness of a layer on a substrate from the normalized signal.

Motivation for Giapis to use Piwonka-Corle's signal analyzer to determine a thickness of a layer on a substrate from the normalized signal is to determine film thicknesses more accurately (column 15, lines 10-15).

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1. Claims 6-10, and 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giapis et al (USPat. 5,002,631) and Piwonka-Corle (USPat. 5,608,526), in view of Cates et al (USPat. 5,328,517). Giapis and Piwonka-Corle are discussed above. Giapis and Piwonka-Corle do not teach a signal analyzer that performs the normalization by assigning a specific mathematical algorithm for the normalization.

Cates teaches an apparatus for removing material from a substrate (column 3, lines 21-44). Cates further teaches a similar photodetecting system and associated components (column 3, lines 44-65). Specifically, Cates teaches:

- iii. a signal analyzer (148; column 15, line 44 – column 16, lines 10) adapted to normalize the sample signal (“signals received in each data channel”) relative to the reference signal (18’; Figure 8; column 15, lines 60-68) by mathematically operating (column 18) on the sample signal with the reference signal to generate a normalized signal (column 16, lines 5-10)
- iv. a signal analyzer that performs the normalization by assigning a specific mathematical algorithm for the normalization (column 18, lines 30-45)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Giapis and Piwonka-Corle to reprogram Piwonka-Corle’s signal analyzer in the manner of Cates’ signal analyzer that performs the normalization by assigning a specific mathematical algorithm for the normalization.

Motivation for Giapis and Piwonka-Corle to reprogram Piwonka-Corle’s signal analyzer in the manner of Cates’ signal analyzer that performs the normalization by assigning a specific

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mathematical algorithm for the normalization is to generate Cate's weighted sum average (column 18, lines 24-43).

3. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Giapis et al (USPat. 5,002,631) and Piwonka-Corle (USPat. 5,608,526), in view of Taketora Saka (JP01260304). Giapis and Piwonka-Corle are discussed above. However, Giapis and Piwonka-Corle do not teach a lens to focus the reference radiation from the radiation source onto the first fibers. Taketora Saka shows a lens (6) in Taketora Saka's Figure focusing radiation between the reference radiation (3) and the substrate (1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Giapis and Piwonka-Corle to use Taketora Saka's lens to focus the reference radiation from the radiation source onto the first fibers.

Motivation for Giapis and Piwonka-Corle to use Taketora Saka's lens to focus the reference radiation from the radiation source onto the first fibers is drawn to the level of ordinary skill in the art whereby lens optics are known to focus, i.e. concentrate, light rays thereby increasing the radiations intensity to a small area.

4. Claims 40-51, and 57-59 are rejected under 35 U.S.C. 103(a) as being anticipated by Giapis et al (USPat. 5,002,631) in view of Ish-Shalom et al (USPat. 6,299,346). Giapis is discussed above. However, Giapis does not teach a feedback controller adapted to regulate a power level of the radiation source in relation to the detected intensity of the second radiation. Ish-Shalom teaches fiber optic (24, Fig.2a) spectroscopy of a wafer (10). Ish-Shalom additionally

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teaches a chamber (14) comprising an electro-optical shutter (23) modulated (column 10, lines 40-45) radiation source (28), first (32) and second (34) detectors for detecting an intensity of a first radiation reflected (column 9, lines 20-39) from a substrate and the detection of an intensity of a second radiation from the radiation source. Specifically, Ish-Shalom teaches a feedback controller (36) adapted to regulate a power level (column 11, lines 8-15) of a reference radiation (28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Giapis to use Ish-Shalom's feedback controller adapted to regulate a power level of a reference radiation.

Motivation for Giapis to use Ish-Shalom's feedback controller adapted to regulate a power level of a reference radiation is to allow correction for electronic drifts (column 11, lines 1-18).

2. Claim 60 is rejected under 35 U.S.C. 103(a) as being anticipated by Giapis et al (USPat. 5,002,631) and Ish-Shalom et al (USPat. 6,299,346) in view of Piwonka-Corle (USPat. 5,608,526). Giapis and Ish-Shalom are discussed above. However, Giapis and Ish-Shalom do not teach

- v. a signal analyzer adapted to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal with the reference signal to generate a normalized signal, and determine a thickness of a layer being etched on the substrate or chamber wall from the normalized signal

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Piwonka-Corle teaches an ellipsometry apparatus (Figure 12) for substrate analysis (column 3, lines 9-20). Specifically, Cates teaches:

- vi. a signal analyzer (100; column 15, lines 9-23) adapted to normalize the sample signal (9) relative to the reference signal ("reference beam") by mathematically operating on the sample signal with the reference signal to generate a normalized signal ("is programmed to normalize"), and determine a thickness of a layer on a substrate from the normalized signal

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Giapis and Ish-Shalom to use Piwonka-Corle's signal analyzer to determine a thickness of a layer on a substrate from the normalized signal.

Motivation for Giapis and Ish-Shalom to use Piwonka-Corle's signal analyzer to determine a thickness of a layer on a substrate from the normalized signal is to determine film thicknesses more accurately (column 15, lines 10-15).



***Response to Arguments***

3. Applicant's arguments filed September 17, 2002 have been fully considered but they are not persuasive. The arguments based on the present amendments to the claims are addressed in the above new rejections as necessitated by these amendments.

4. Applicant's challenge of Ish-Shalom's effective filing date of the provisional application 60/123,371 on March 8, 1999 has been fully considered as evidenced by the Examiner's endorsement of Applicant's PTO-1449 IDS containing a copy of 60/123,371. The Examiner has reviewed provisional application 60/123,371 and has determined that Ish-Shalom does provide support for Ish-Shalom's control system which is described in Ish-Shalom's patent as directing "incident radiation intermittently by turning radiation source on and off". Evidence in 60/123,371 that Ish-Shalom's provides support for directing "incident radiation intermittently by turning radiation source on and off" is found in the Figures of 60/123,371. The second Figure of 60/123,371 (not numbered, title illegible) shows the LED source as the reference which is powered by "LED Power Control". In turn, the "LED Power Control" is controlled by "TC/B" or the timing control unit / bus.

5. In response to applicant's argument that "Saka does not make up for the deficiencies of Giapis et al. because Saka also does not teach or suggest the substrate etching apparatus...An apparatus adapted to etch a substrate is not the same as an apparatus adapted to coat an object...", a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use

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must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

6. The remaining arguments concerning Saka and Kubota are mute in view of the new grounds for rejection.

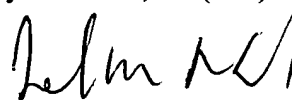
### ***Conclusion***

7. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.



JEFFRIE R. LUND  
PRIMARY EXAMINER